

# Pulse and Blood Pressure

## Background

Reading of vital signs, such as pulse and blood pressure, provides important data on a person's health. In the treatment of patients in emergencies, vital signs are indispensable data. Also, vital signs provide immediate data on the state of vascular fitness and overall physical health. Many jobs require employees to be physically fit. This is especially true for astronauts because of the stresses of lift-off, re-entry, and working in a low-gravity environment.

The pulse rate is stated as a ratio of palpable (reportable by sense of touch) beats in the carotid artery or distal radial artery per minute. If the pulse is absent after palpating for nine seconds, then the patient is clinically dead and CPR must be started to keep the brain and the rest of the body from biological death. If the pulse rate is above 100 for an adult, this condition is referred to as tachycardia, "fast heart." When the pulse is below 60, it is called bradycardia, "slow heart." Many athletes' hearts pump blood so efficiently that their pulse rates may be below 60.

Blood pressure is measured by listening to the sounds of blood flow heard through a stethoscope placed on the distal brachial artery or the proximal ulnar artery while a constricting cuff gradually releases. The pressure in the cuff is visually reported in mm of mercury at two intervals: when the sounds are first heard and when the sounds can no longer be heard. These two values are, respectively, systolic (when the heart is pumping) and diastolic (between pumping). Blood pressure readings indicate the pressure that is exerted by the blood upon the wall of the vessels, especially the arteries. Knowing these values can be useful for diagnosing shock or illness.

## Skills

- Collecting data
- Recording data

## Objectives

Students will:

- Use medical instruments to measure pulse rate and blood pressure.
- Verify readings for accuracy.

## Overview

Students will use a stethoscope and a blood pressure cuff. Students will monitor and record vital signs of fellow classmates.

## Key Question

How can scientists monitor human biological systems?

## Key Concepts

- Scientists use a stethoscope and a blood pressure cuff to measure blood pressure.
- Medical data must be carefully collected and recorded.
- Heart rate is a fundamental vital sign.

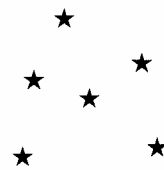
## Materials & Preparation

- 1 Stethoscope per pair
  - 1 Sphygmomanometer (blood pressure cuff, valve, and meter) per pair
  - Alcohol swabs
  - Clock with a second hand
1. Obtain stethoscopes and blood pressure cuffs.
  2. Assign students to teams of two.
  3. Instruct them to use alcohol swabs to clean the earpieces of the stethoscopes between each use.
  4. Discuss background information.
  5. Discuss safety procedures, including proper placement of blood pressure cuff, only leaving the cuff on for less than 3 minutes, and not tapping on the stethoscope.

## Management

This activity will take one class period.

This activity requires a stethoscope and a blood



pressure cuff for each team of two. Stethoscopes, when used improperly, can cause ear damage. Monitor students closely.

**Reflection & Discussion**

1. What happens to your heart rate when you are afraid? Relaxed? Stressed?
2. Could everyone find their partner's distal radial pulse?
3. How does living in space affect the heart rate? Deep-sea diving?
4. Why do you think that high blood pressure might be dangerous?
5. Can you think of ways a person might try to lower his or her blood pressure or pulse rate?
6. Can you think of other uses for the stethoscope?

7. What other human systems need to be monitored on a regular basis?
8. How can technology help scientists accurately monitor these systems?

**Transfer & Extension**

1. First, take pulse rate and blood pressure readings and record. Then, begin exercising such as running in place or rapidly stepping up and down on a low (15 cm) bench or step for three minutes. Repeat the pulse rate and blood pressure readings and record. Are there any differences? Research reasons for your findings and report them to the class.
2. Why do you think the sphygmomanometer measures pressure in millimeters of Mercury (Hg)?



